MAINTENANCE BULLETIN

NO. 159
AUGUST 1998

ALFA COMPANY

Seabee Logistic Center
4111 San Pedro St., Bldg. 1443
Port Hueneme, California 93043-4410

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You are invited to send your ideas for improving maintenance procedures, suggestions for articles, or comments on material published in the Maintenance Bulletin.

Just write to:

Commanding Officer
Naval Construction Battalion Center
Seabee Logistic Center
Logistic Directorate (Code 15L)
4111 San Pedro St., Bldg. 1443
Port Hueneme, Ca 93043-4410

SAFETY OF USE MESSAGE (SOUM), TACOM 98-10
TECHNICAL BULLETIN ON RETEADS

1. PROBLEM

A. Recent testing for the National Retread program and field reports of widespread failures has shown that nondirectional cross country (NDCC) bias ply tires, when retreaded, will experience a high rate of failures.

B. Tread separation and/or tread casing separation may occur during vehicle operation or while inflading the NDCC tires. Such failures can result in a sudden loss of air, flying debris, loss of vehicle control damage to equipment, injury, and/or death to personnel.

2. USERS ACTION

A. Perform the following actions. Inspect and replace any nondirectional cross country (NDCC) bias ply retreaded tire(s) found on steering axles and on single wheel non-steering axle's as soon as possible.

B. At the units maintenance level, inspect all vehicles to identify those vehicles using NDCC bias ply retreaded tires. An NDCC bias ply tire can be identified by referring to the illustration on page 1-3 of the TM 9-2610-200-14, Nov. 90. A retreaded tire can be identified by the presence of the word "DOT-R" on the sidewall of the tire.

C. Remove all NDCC retreaded bias ply tires from steering axles and single wheel non-steering axles and replace with non-retreaded or new NDCC tires.

D. Remove dual wheel NDCC retreaded bias ply tires when tread depth of 4/32" or less and replace with non-retreaded or new NDCC tires.

E. Discontinue retreading nondirectional cross country tires with NSNS 2610-00-262-8653 and 2610-00-262-8677 and discontinue local contracting for retreaded services for these tires.

3. SUPPLY

A. The following stock is AKZ managed, on hand and available:

(1) Nondirectional cross-country non-retread 2610-00-262-8653, 11.00X20, estimated cost $140.00

(2) Inner tube 2610-00-051-9450, estimated cost $19.66

(3) Nondirectional cross country non retread 2610-00-262-8677, 9.00X20, estimated cost $99.20

(4) Inner tube 2610-00-269-7383, estimated cost $15.26

B. Disposition

(1) Use of NDCC retreaded tires from the single wheel vehicles on the duals until worn to a tread depth of 4/32" is authorized.

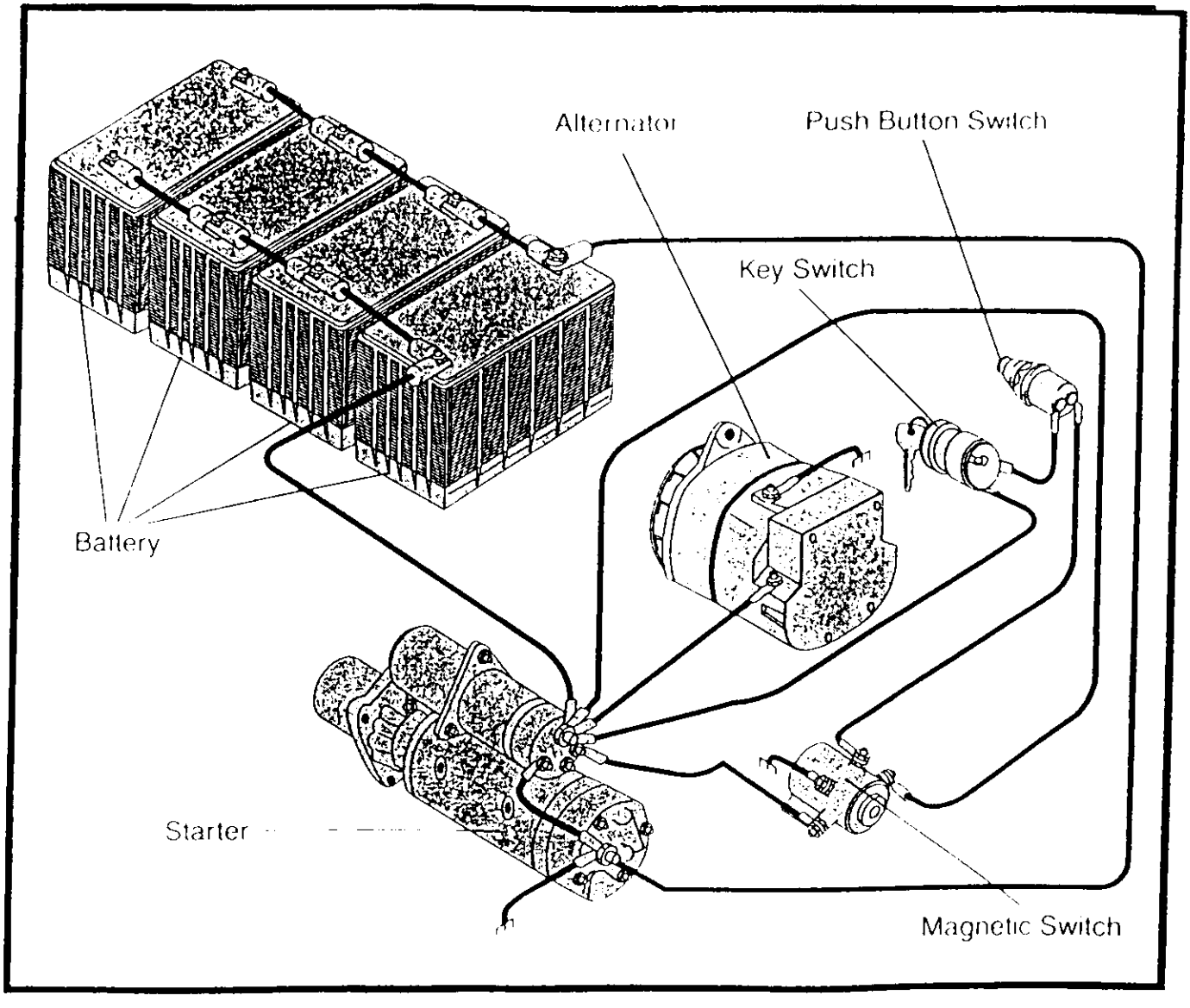
(2) Downgrade retreaded nondirectional cross country tires to a condition code "H" and dispose at local defense reutilization management office (DRMO).

COURTESY OF ARMY TECHNICAL BULLETIN:

HEAVY DUTY ELECTRICAL SYSTEM

A heavy duty electrical system is made up of the starting system and the charging system. These systems consist of the batteries, starter, alternator, interconnecting wiring, and electrical and mechanical switches.

Batteries supply the power to the starter, which cranks the engine. The magnetic switch controls the battery current to the starter solenoid. The ignition and push button switches activate magnetic switches, which energize the starter. Once started, the engine powers the alternator, which recharges the batteries.



TIPS FOR DEALING WITH ELECTRICAL SYSTEMS

BATTERIES

Of all the electrical components, batteries are the ones that require the most attention. Here are some routine maintenance procedures to keep in mind.

- Always maintain batteries at their proper charge. A battery that its overcharged or under-charged will not only function improperly, it will be damaged.

- Before servicing or testing any battery, disconnect it from the battery cables and tie the cables back to prevent contact. The amount of "charge" a battery has can be determined by measuring its "specific gravity" with a hydrometer or a voltmeter if the battery is maintenance-free. The accepted standard for open circuit voltage is 12.4 or higher for a 12-volt battery. This represents about 65 percent state of charge, which is adequate for load testing.

- Keep the top of the battery clean to eliminate acid and dirt build-up, which can allow current to flow between the terminals and slowly discharge the battery.

- Check battery hold-downs to make sure they are neither too tight, which can cause the battery to crack, nor too loose, which can cause the battery to vibrate and bounce.

- If an electrical system consists of two 12-volt batteries wired in series to produce 24-volts, don't use one of the batteries to draw 12 volts, the alternator will sense the draw and will recharge the batteries. With only one of the batteries discharging, the other will be overcharged and damaged.

- If a machine is taken out of service for any length of time, say a month or more, maintain the battery in a charged state and keep the ground side circuit open, either by disconnecting at the terminals or by using the disconnect switch found on many machines.

- Remember: On-board computers and processors remain "on" even if the machine is turned off. These electronics draw a small current to keep their memories alive. A machine with a number of these devices all drawing a current can discharge the battery if the machine is stored for a long period.

- Always replace original equipment batteries with ones that can deliver at least as many cold cranking amps as the originals.

ALTERNATORS

Alternator belts require periodic inspection and adjustment, unless they are self-adjusting.

- Put pressure on the belt with a thumb when the engine is off. If the belt deflects more than half an inch, it should be replaced. Better yet, use a tension gauge and follow manufacturer's instructions.

- When replacing belts, never mix belt types or use a new belt with an old belt. Always loosen the alternator and idler pulleys sufficiently when installing new belts to prevent stretching the belts during installation. Never use a screwdriver to roll a belt over the side of a pulley or lever it into place, which can damage the belt's side wall and cords.

CIRCUITRY

The cables and wiring that connect electrical components are subject to wear caused by vibration, corrosion, temperature changes, or damage.

- Excessive power loss in the cables that carry the high starter current can cause slow cranking speeds, especially in cold weather, which can lead to starter burn-up if the starter is cranked for more than 30 seconds.

- The solenoid circuit consists of wiring from the batteries, through a push button or magnetic switch, to the "S" terminal of the started solenoid. Excessive loss here can cause the solenoid to shift in and out, preventing the machine from starting.

- The magnetic switch circuit is made up of the wiring from the battery through a key switch and/or a start button to the coil of the magnetic switch and back to the battery. Excessive loss prevents starting.

- Wiring between the alternator and battery and back to the alternator makes up the charging circuit. Power loss here can prevent the batteries form charging properly.

SOURCES OF SUPPLY

1. WRECKERS

Having problems finding parts for your wrecker bodies allowance parts list (APL) 950005968, manufactured by Canfield Tow Bar company?
The manufacturer went out of business but Rick Farrell at Detroit Wrecker, says he can get any part you need except gear box casting. He can be reached at (313) 835-8700.

2. MR TRAILERS

The welder/generator in the shop equipment, general purpose repair trailer (Mr Trailer) with APL's 950003938, 950005475 and 950004223, manufactured by Hobart. Parts are no longer available through Hobart, Thermal ARC-prestolite acquired the interests in Hobart's 250 amps and up line. They can be reached at 1-800-255-5846.

Thanks to CM1 Larrabee, THIRD NCB

SUBJECT: **LIGHT FOR TOWED EQUIPMENT**

1. This technical bulletin provides guidance for transporting NCF unlighted towed equipment.
2. To ensure safe practices and federal compliance, towed equipment without light will only be transported on public ways by mobile loading, or with a placard (reflected triangle) and a lighted trailing escort.
3. Towing of unlighted equipment is acceptable only when part of an authorized convoy, and incorporated into the convoy (not as a lead or ending vehicle).
4. All cognizant personnel will be made aware of and comply with the contents of this technical bulletin. Post this bulletin in ALFA Company equipment's spaces and dispatch.
5. This bulletin will remain in effect until canceled or superseded.

SOURCE: N46 SECOND NCB/THIRD NCB

SUBJECT: **MAINTENANCE ADVISORY MESSAGE (MAM), TACOM-WRN CONTROL NO. MAM-98-006, FOR ALL M998 AND M998A1 SERIES HIGH MOBILITY MULTIPURPOSE WHEELED VEHICLE (HMMWV) EQUIPPED WITH 100AMP ALTERNATOR**

1. ISSUE: RESEARCH HAS REVEALED THAT VEHICLES EQUIPPED WITH 100AMP ALTERNATORS HAVE A POTENTIAL TO FAIL THE PROTECTIVE CONTROL BOX (PCB) CIRCUIT. THIS CAN HAPPEN WHEN VEHICLE EQUIPMENT LOADS DEMAND 100AMPS OR MORE AND THE ALTERNATOR IS CONTINUOUSLY FURNISHING HIGH CURRENT OUT PUT THROUGH THE PCB.

2. TACOM/PM ACTIONS: THE FOLLOWING TECHNICAL MANUALS (TM) WILL BE REVISED AS A RESULT OF THE INFORMATION CONTAINED IN THIS MESSAGE: TM9-2320-280-20-1, TM9-2320-2280-20-2, TM9-2320-280-20-3,, TM9-2320-280-24P. AND TM9-2320-280-34.

SUBJECT: **MAINTENANCE ADVISORY MESSAGE (MAM), TACOM-WRN CONTROL NO. MAM-98-007, FOR ALL M998 SERIES HIGH MOBILITY MULTIPURPOSE WHEELED VEHICLE (HMMWV)**

1. ISSUE: TACOM HAS DEVELOPED A DISTRIBUTION BOX ASSEMBLY NSN 6110-01-446-7125 THAT REPLACES THE PROTECTIVE CONTROL BOX (PCB) NSN 610-01-395-9585 AND GLOW PLUG CONROLLER (GPC) NSN 2920-01-175-7214.

2. USER ACTIONS: THE NEXT TIME EITHER THE PCB OR THE GPC FAIL REPLACE THE PCB WITH THE DISTRIBUTION BOX, NSN 6110-01-446-7125. THIS NSN CONSISTS OF THE DISTRIBUTION BOX, GLOW PLUG WIRE HARNESS, MOUNTING HARDWARE, TEMPLATE, AND INSTALLATION INSTRUCTIONS. THE GPC REMAINS IN PLACE BECAUSE IT FILLS A HOLE IN THE WATER JACKET. THE EXISTING GLOW PLUG WIRES ARE TIED BACK OUT OF HARMS WAY.

3. ALL COSTS ASSOCIATIED WITH THE ACQUISITION AND INSTALLATION OF THE DISTRIBUTION BOX ARE THE RESPOSIBILITY OF THE UNIT.

4. TACOM/PM ACTIONS: THE FOLLOWING TECHNICAL MANUALS (TM) WILL BE REVISED AS A RESULT OF THE FOLLOWING INFORMATION CONTAINED IN THIS MESSAGE: TM9-2320-280-20-1, TM9-2320-280-20-2, TM9-2320-280-24P-1, AND TM9-2320-280-24P-2.

5. SLC POINT OF CONTACT IS CMC (SCW) HOLMES DSN 551-1922 OR COMMERCIAL (805) 982-1922.

MODELS: M998 and M998A1 100-amp Alternators

SUBJECT: Rerouting Alternator Positive Cable

DEFICIENCY: Vehicles equipped with 100 Amp Alternators have a potential to fail the Protective Control Box (PCB). This can happen when vehicle equipment loads demand 100 amps or more and the alternator is continuously furnishing high current out put through the PCB.

COMMENTS: A procedure has been developed to fabricate, install, and route a new positive cable through the starter positive terminal which can withstand full alternator output. This can be accomplished in the field by using the following procedures, parts, and materials.

SECTION I. PARTS/MATERIALS

NSN/PART NO. CAGE	NOMENCLATURE	QTY
6145-00-538-8222	Wire, Electrical (6 ft.)	1
5970-01-344-4689	Conduit, Convoluted (6 ft.)	1
5970-00-812-2967	Sleeving, Insulation (1 ft.)	1
5970-00-644-3167	Tape, Electrical	1
3439-00-133-1108	Solder	1
5440-00-114-1315	Lug, Terminal	1
5940-00-115-2674	Lug, Terminal	1
9905-00-893-3570	Band, Marker	2
8030-01-328-0574	Sealant, Adhesive	1
9150-01-015-1542	Grease	1
5975-01-034-5871	Strap, Tiedown	3
5310-00-582-5965	Lockwasher (For Prestolite 100-amp alternator system)	1
5310-01-162-9661	Lockwasher *	
	*(For older Prestolite 100-amp alternator system)	2
	*(For newer Prestolite 100-amp alternator system)	4
214E2V02 7Z043	Boot	1
5340-00-053-8994	Clamp	3
5310-01-210-1587	Washer	1
5310-01-206-7306	Lockwasher	3
5310-01-315-1535	Nut	1
5310-01-216-7390	Lockwasher	1
5340-00-809-1494	Clamp	1
5310-01-152-0598	Locknut	1

SECTION II. POSITIVE CABLE

A. Fabricate Positive Cable.

1. Using NSN 6145-00-538-8222 electrical wire (4), cut a 72.00-in. section as shown in figure 1.
2. Using NSN 5970-01-344-4689 convoluted conduit (6), cut a 68.00-in. section as shown in figure 1.
3. Using NSN 5970-00-812-2967 insulation sleeving (2), cut two 1.50-in. sections as shown in figure 1.
4. Place convoluted conduit (6) over electrical wire (4) as shown in figure 1.
5. Position convoluted conduit (6) 3.00-in. from end of electrical wire (4) and secure both ends of convoluted conduit (6) to electrical wire (4) with NSN 5970-00-644-3167 electrical tape (5) as shown in figure 1.

NOTE

When connecting electrical wire to terminal lug, use NSN 3439-00-133-1108 solder. (Refer to TB SIG-222 for soldering.) When soldering terminal lugs to electrical wire, position insulation sleeving away from terminal lug to avoid premature shrinking of insulation sleeving.

6. Place insulation sleeve (2) over end of electrical wire (4) and connect NSN 5940-00-114-1315 terminal lug (1) to electrical wire (4) as shown in figure 1.
7. Position insulation sleeve (2) over electrical wire (4) and terminal lug (1) and secure by heat-shrinking insulation sleeve (2) as shown in figure 1.
8. Stamp identification number 6D on NSN 9905-00-893-3570 marker band (3) as shown in figure 1.
9. Install marker band (3) on electrical wire (4) as shown in figure 1.
10. Place insulation sleeve (2) over opposite end of electrical wire (4) and connect NSN 5940-00-115-2674 terminal lug (7) to electrical wire (4) as shown in figure 1.
11. Position insulation sleeve (2) over electrical wire (4) and terminal lug (7) and secure by heat-shrinking insulation sleeve (2) as shown in figure 1.
12. Stamp identification number 6E on NSN 9905-00-893-3570 marker band (3) as shown in figure 1.
13. Install marker band (3) on electrical wire (4) as shown in figure 1.

SECTION III. VEHICLE PREPARATION

1. Disconnect battery ground cable. (Refer to TM 9-2320-280-20.)
2. Raise and secure hood. (Refer to TM 9-2320-280-10.)

SECTION IV. 100-AMP ALTERNATOR AND ENGINE HARNESS PROCEDURE

A. Modifying Older Model Prestolite 100-amp Alternator and Electrical Harness.

1. Remove two screws (3), lockwashers (2), and cover (1) from regulator (5) as shown in figure 2. Discard lockwashers (2).
2. Remove sealant from regulator cavity (6) as shown in figure 2.
3. Remove nut (9), lockwasher (8), and lead 5A (4) from regulator terminal (7) as shown in figure 2. Discard lockwasher (8).
4. Remove terminal lug (3) from lead 5A (1) as shown in figure 6.

5. Using NSN 5970-00-812-2967 insulation sleeving (2), cut 3.00-in. section as shown in figure 6.

6. Position insulation sleeve (2) over lead 5A (1) to a point of 0.75-in. from end of lead 5A (1) as shown in figure 6.

7. Apply NSN 8030-01-328-0574 adhesive sealant to 0.75-in. open end of insulation sleeving (2) and secure insulation sleeving (2) to lead 5A (1) by heat-shrinking insulation sleeving (2) as shown in figure 6.

8. Bend lead 5A (1) over toward harness (5) and secure with two NSN 5975-01-034-5871 tiedown straps (4) as shown in figure 6.

9. Install positive cable lead 6E (6) on regulator terminal (9) with NSN 5310-00-582-5965 lockwasher (10) and nut (11) as shown in figure 7. Tighten nut (11) to 50 lb-in. (5.6 N-m).

NOTE

Ensure regulator cavity is completely filled with sealant to form a watertight seal. Ensure sealant is completely dry before placing vehicle back into service.

10. Apply NSN 8030-01-328-0574 adhesive sealant to regulator cavity (8) and secure cover (1) to regulator (7) with two NSN 5310-01-162-9661 lockwashers (2) and screws (3) as shown in figure 7.

11. Secure positive cable (6) to harness (5) with NSN 5975-01-034-5871 tiedown strap (4) as shown in figure 7.

12. Proceed to Section V, Positive Cable Installation.

B. **Modifying Newer Model Prestolite 100-amp Alternator and Electrical Harness.**

1. Remove four screws (3), lockwashers (2), and cover (1), and gasket (13) from regulator (7) as shown in figure 3. Discard lockwashers (2).

2. Remove sealing wedge (12) from regulator cavity (8) and wire leads (4), (5), and (6) as shown in figure 3.

3. Remove nut (11), lockwasher (10), and lead 5A (4) from regulator terminal (9) as shown in figure 3. Discard lockwasher (10).

4. Remove terminal lug end (3) from lead 5A (1) as shown in figure 6.

5. Using NSN 5970-00-812-2967 insulation sleeving (2), cut 3.00-in. section as shown in figure 6.

6. Position insulation sleeve (2) over lead 5A (1) to a point of 0.75-in. from end of lead 5A (1) as shown in figure 6.

7. Apply NSN 8030-01-328-0574 adhesive sealant to 0.75-in. open end of insulation sleeving (2) and secure insulation sleeving (2) to lead 5A (1) by heat-shrinking insulation sleeving (2) as shown in figure 6.

8. Bend lead 5A (1) over toward harness (5) and secure with two NSN 5975-01-034-5871 tiedown straps (4) as shown in figure 6.

9. Install positive cable lead 6E (6) on regulator terminal (11) with NSN 5310-00-582-5965 lockwasher (12) and nut (13) as shown in figure 8. Tighten nut (13) to 50 lb-in. (5.6 N-m).

10. Install sealing wedge (14) on wire leads (6), (7), and (8) and place sealing wedge (14) in regulator cavity (10) as shown in figure 8.

11. Install gasket (15), cover (1), on regulator (9) with four NSN 5310-01-162-9661 lockwashers (2), and screws (3) as shown in figure 8.

12. Secure positive cable 6E (6) to harness (5) with NSN 5975-01-034-5871 tiedown strap (4) as shown in figure 8.

13 Proceed to Section V, Positive Cable Installation.

C. **Modifying Niehoff Single Voltage 100-amp Alternator and Electrical Harness.**

1. Slide boot (2) back, remove nut (1), washer (6), and lead 5A (5) from positive terminal (4) on alternator (3) as shown in figure 4.
2. Remove boot (2) from lead 5A (5) as shown in figure 4.
3. Remove terminal lug (3) from lead 5A (1) as shown in figure 6.
4. Using NSN 5970-00-812-2967 insulation sleeving (2), cut a 3.00-in. section as shown in figure 6.
5. Position insulation sleeve (2) over lead 5A (1) to a point of 0.75-in. from end of lead 5A (1) as shown in figure 6.
6. Apply NSN 8030-01-328-0574 adhesive sealant to 0.75-in. open end of insulation sleeving (2) and secure insulation sleeving (2) to lead 5A (1) by heat-shrinking insulation sleeving (2) as shown in figure 6.
7. Bend lead 5A (1) over toward harness (5) and secure with two NSN 5975-01-034-5871 tiedown straps (4) as shown in figure 6.
8. Install P/N 214E2V02 boot (2) on positive cable lead 6E (5) as shown in figure 9.
9. Install positive cable lead 6E (5) on positive terminal (4) of alternator (3) with washer (6) and nut (1) as shown in figure 9. Tighten nut (1) to 65 lb-in (7 N·m).
10. Apply NSN 9150-01-015-1542 grease to inside of boot (2) and slide boot (2) over nut (1) and positive terminal (4) as shown in figure 9.
11. Proceed to Section V, Positive Cable Installation.

D. **Modifying Niehoff Dual Voltage 100-amp Alternator and Electrical Harness.**

1. Slide boot (2) back, remove nut (1), washer (6) and lead 5A (5) from positive terminal (4) on alternator (3) as shown in figure 5.
2. Remove boot (2) from lead 5A (5) as shown in figure 5.
3. Remove terminal lug (3) from lead 5A (1) as shown in figure 6.
4. Using NSN 5970-00-812-2967 insulation sleeving (2), cut a 3.00-in. section as shown in figure 6.
5. Position insulation sleeve (2) over lead 5A (1) to a point of 0.75-in. from end of lead 5A (1) as shown in figure 6.
6. Apply NSN 8030-01-328-0574 adhesive sealant to 0.75-in. open end of insulation sleeving (2) and secure insulation sleeving (2) to lead 5A (1) by heat-shrinking insulation sleeving (2) as shown in figure 6.
7. Bend lead 5A (1) over toward harness (5) and secure with two NSN 5975-01-034-5871 tiedown straps (4) as shown in figure 6.
8. Install P/N 214E2V02 boot (2) on positive cable lead 6E (5) as shown in figure 10.
9. Install positive cable lead 6E (5) on positive terminal (4) of alternator (3) with washer (6) and nut (1) as shown in figure 10. Tighten nut (1) to 65 lb-in (7 N·m).
10. Apply NSN 9150-01-015-1542 grease to inside of boot (2) and slide boot (2) over nut (1) and positive terminal (4) as shown in figure 10.
11. Proceed to Section V, Positive Cable Installation.

SECTION V. POSITIVE CABLE INSTALLATION

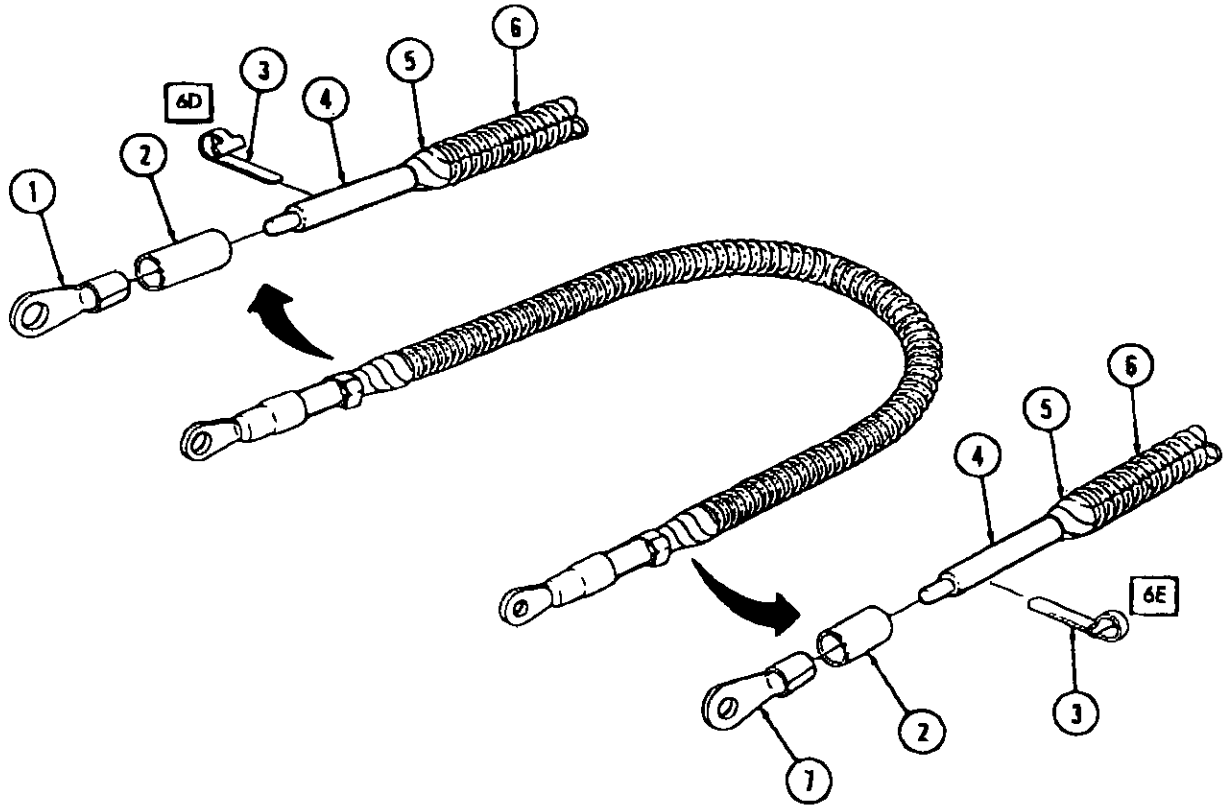
A. Positive Cable Installation.

1. Route positive cable (3) over top of engine (4) as shown in figure 11.
2. Install NSN 5340-00-053-8994 clamp (5) on positive cable (3) and secure to crossover tube stud (9) with NSN 5310-01-210-1587 washer (6), NSN 5310-01-206-7306 lockwasher (7) and NSN 5310-01-315-1535 nut (8) as shown in figure 11.
3. Position positive cable (3) along right-side front of engine (4) as shown in figure 11.
4. Remove nut (10) and lockwasher (7) from stud (2) on engine lift bracket (1) as shown in figure 11. Discard lockwasher (7).
5. Remove nut (10) and lockwasher (7) from stud (11) on engine (4) as shown in figure 11. Discard lockwasher (7).
6. Install NSN 5340-00-053-8994 clamp (5) on positive cable (3) and secure to stud (11) on engine (4) with NSN 5310-00-206-7306 lockwasher (7) and nut (10) as shown in figure 11.
7. Install NSN 5340-00-053-8994 clamp (5) on positive cable (3) and secure to stud (2) on engine lift bracket (1) with NSN 5310-01-206-7306 lockwasher (7) and nut (10) as shown in figure 11.
8. Route positive cable lead 6D (10) along right side of engine (2) and body (1) toward starter (5) as shown in figure 12.
9. Remove sealant from starter positive terminal (7) as shown in figure 12.
10. Remove nut (8) and lockwasher (9) from starter positive terminal (7) as shown in figure 12. Discard lockwasher (9).
11. Install positive cable lead 6D (10) on starter positive terminal (7) with NSN 5310-01-216-7390 lockwasher (9) and nut (8) as shown in figure 12. Tighten nut (8) to 25-30 lb-ft (34-41 N·m).
12. Apply NSN 8030-01-328-0574 adhesive sealant to positive terminal (7) and wire leads (6) and (10) as shown in figure 12.
13. Remove nut (4) from screw (12) on starter cable support bracket (11) as shown in figure 12. Discard nut (4).
14. Install NSN 5340-00-809-1494 clamp (3) on positive cable 6D (10) and secure to starter cable support bracket (11) with clamp (3), screw (12), and NSN 5310-01-152-0598 locknut (4) as shown in figure 12.
15. Lower hood. (Refer to TM 9-2320-280-10.)
16. Connect battery ground cable. (Refer to TM 9-2320-280-20.)

PUBLICATIONS AFFECTED: TM 9-2320-280-20
TM 9-2320-280-24P

LEVEL OF MAINTENANCE: Unit

NOTE: ALL DIMENSIONS ARE IN INCHES



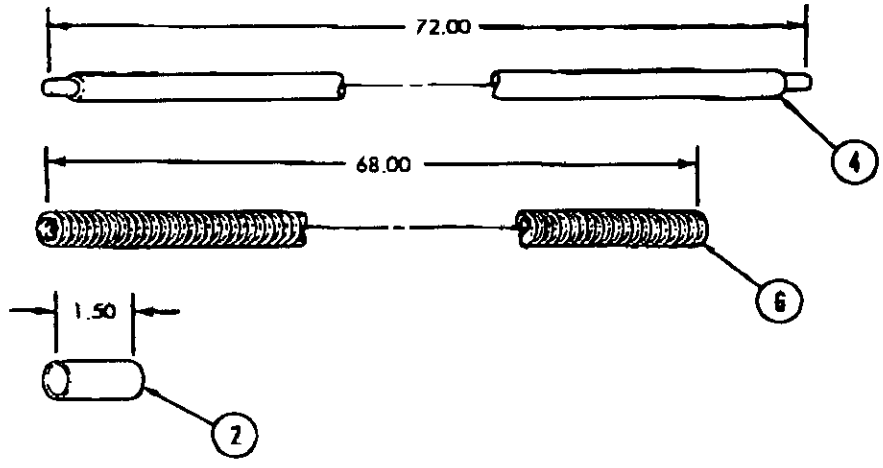


Figure 1

Prestolite Alternator Assembly
Older Model

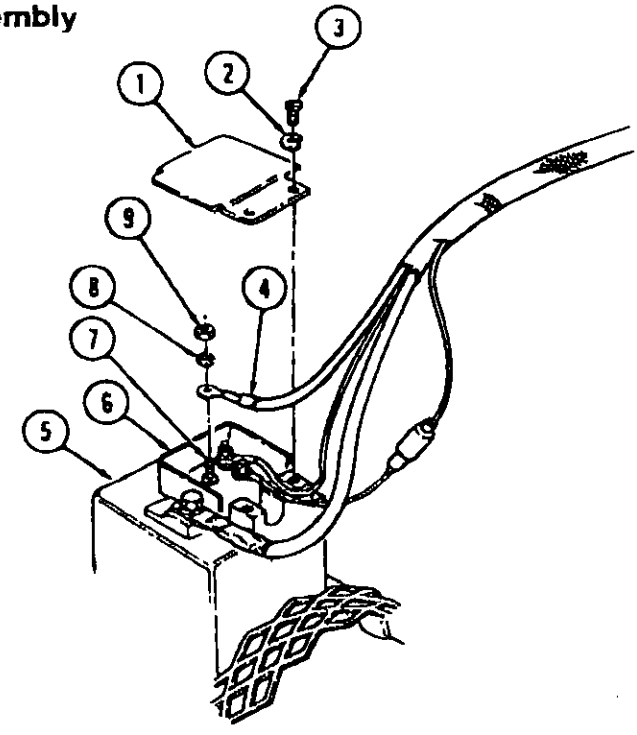


Figure 2

Prestolite Alternator Assembly
Newer Model

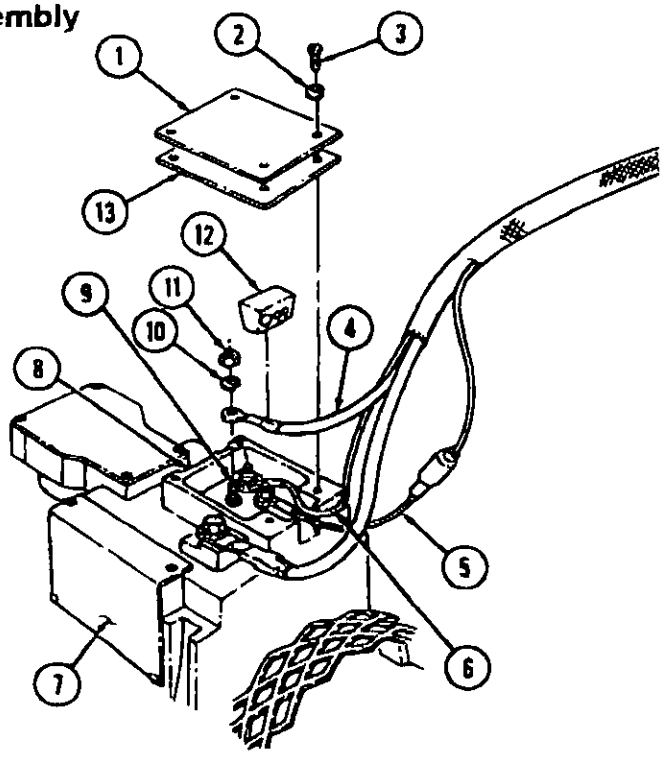


Figure 3

Niehoff Alternator Assembly
Single Voltage

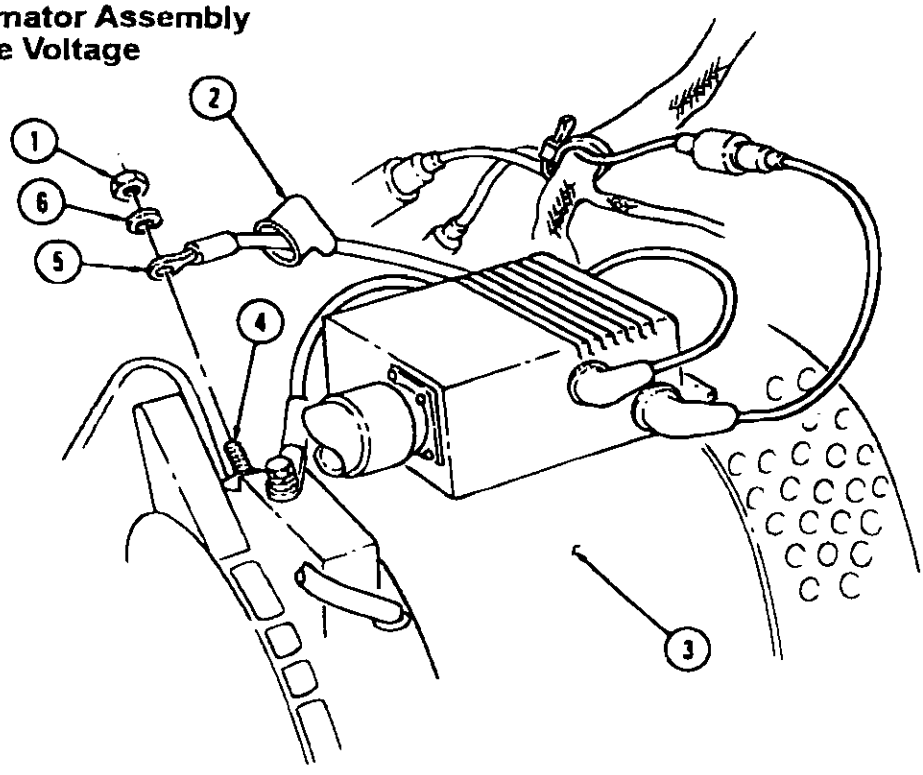


Figure 4

Niehoff Alternator Assembly
Dual Voltage

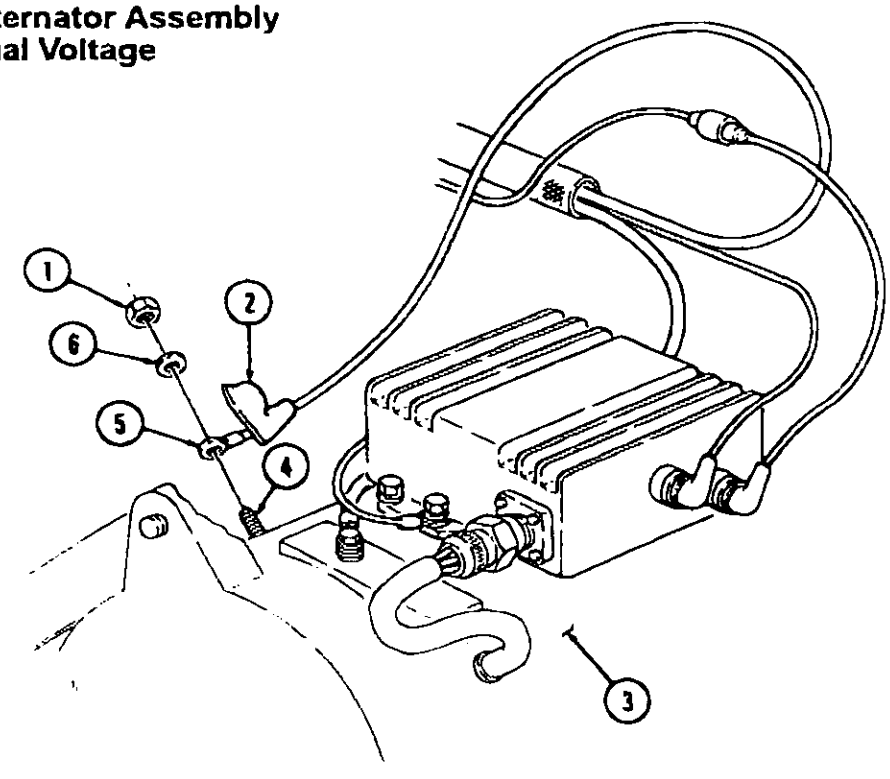
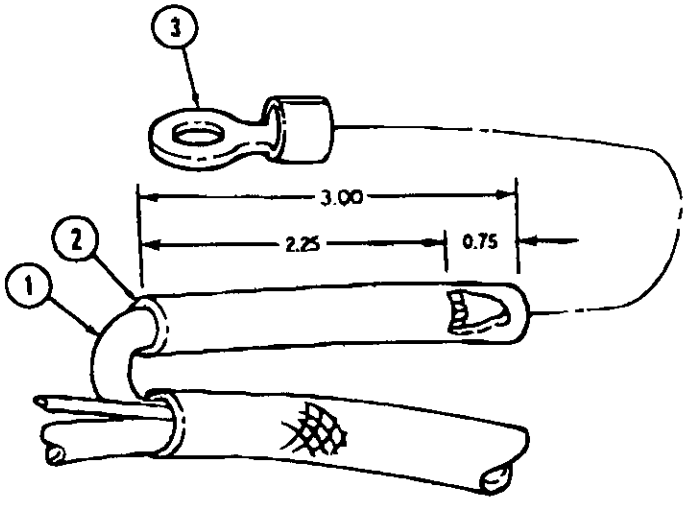


Figure 5

NOTE: ALL DIMENSIONS ARE IN INCHES



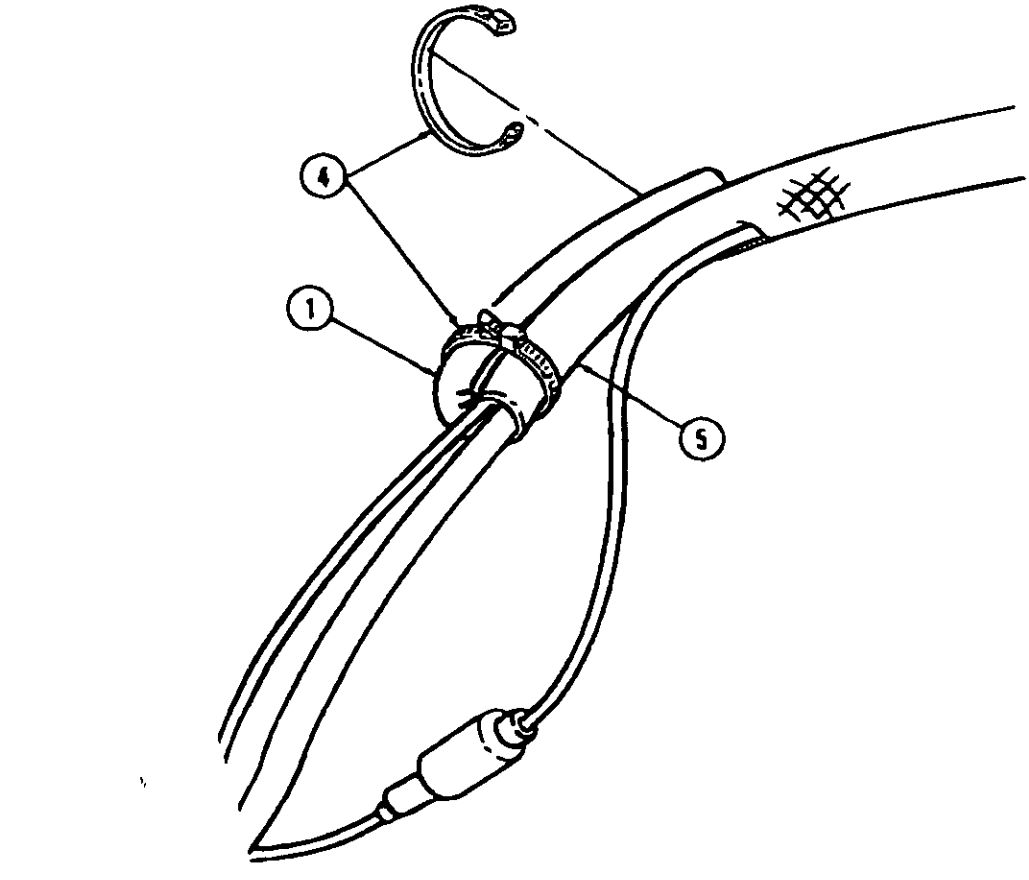


Figure 6

Prestolite Alternator Assembly
Older Model

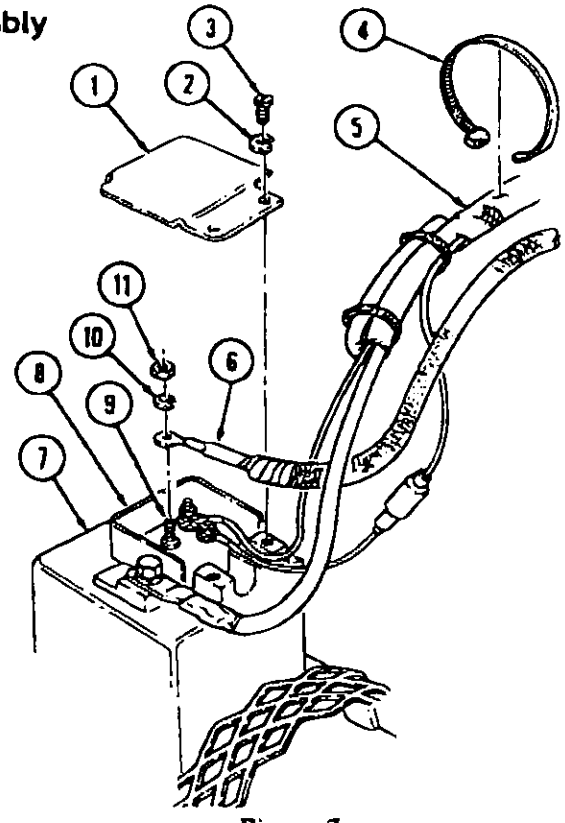


Figure 7

Prestolite Alternator Assembly
Newer Model

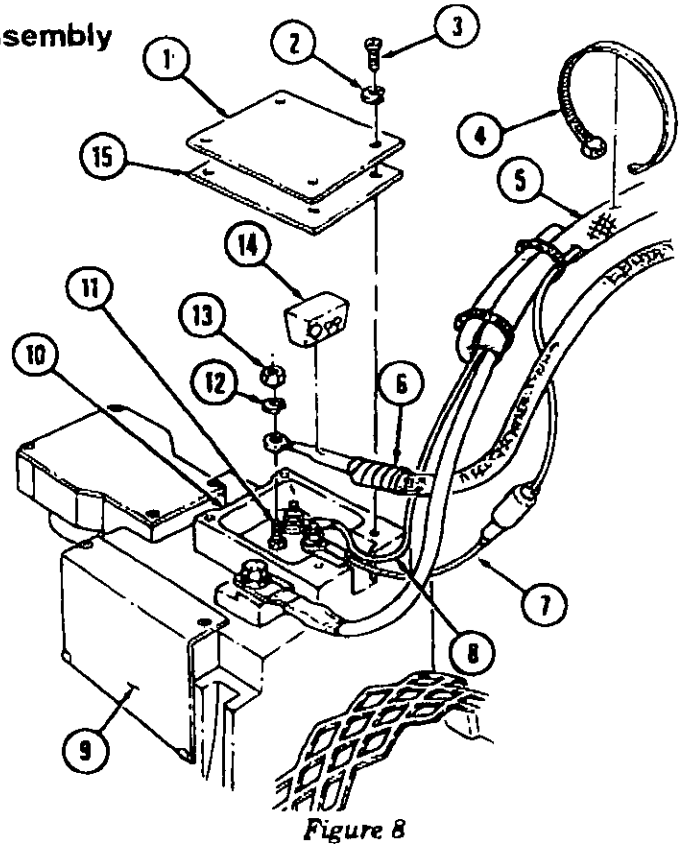


Figure 8

Niehoff Alternator Assembly
Single Voltage

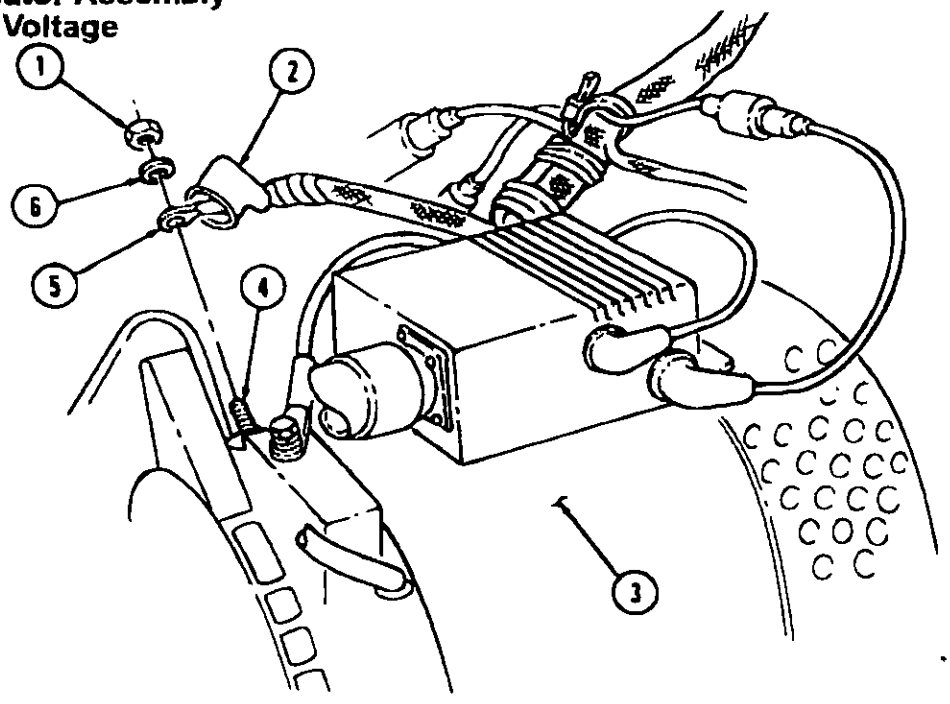


Figure 9

Niehoff Alternator Assembly
Dual Voltage

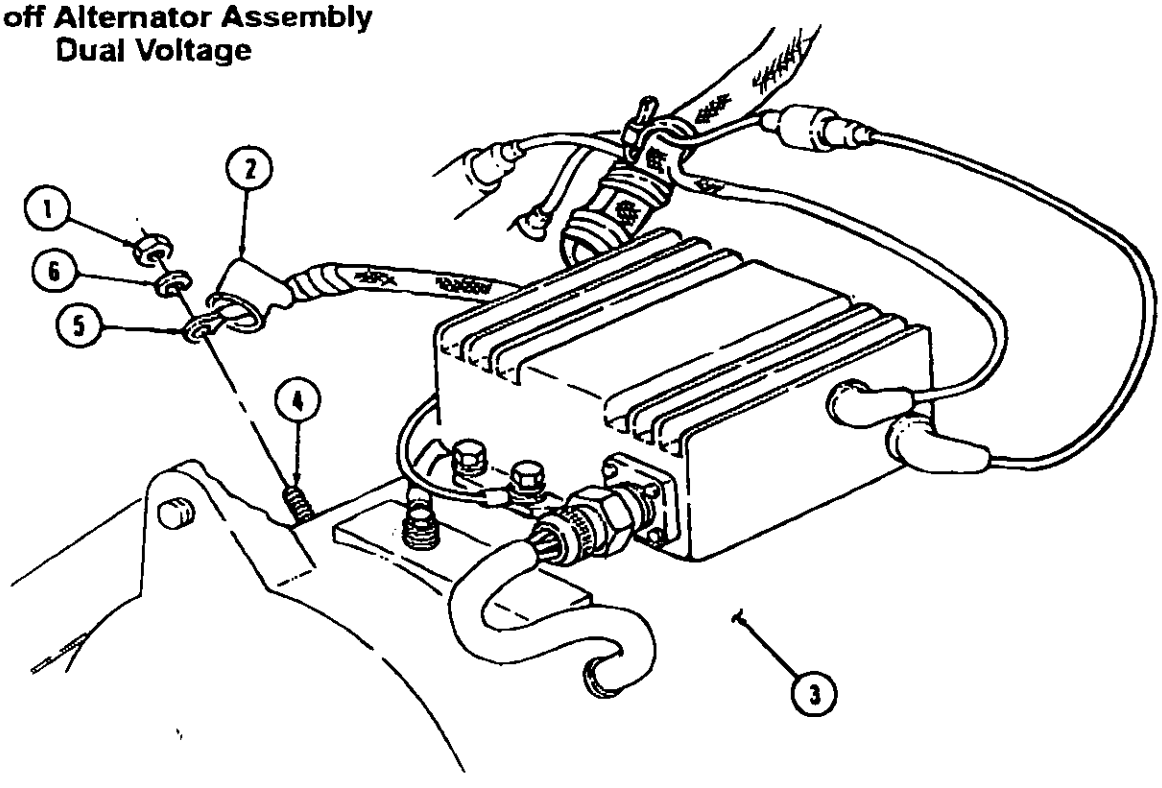


Figure 10

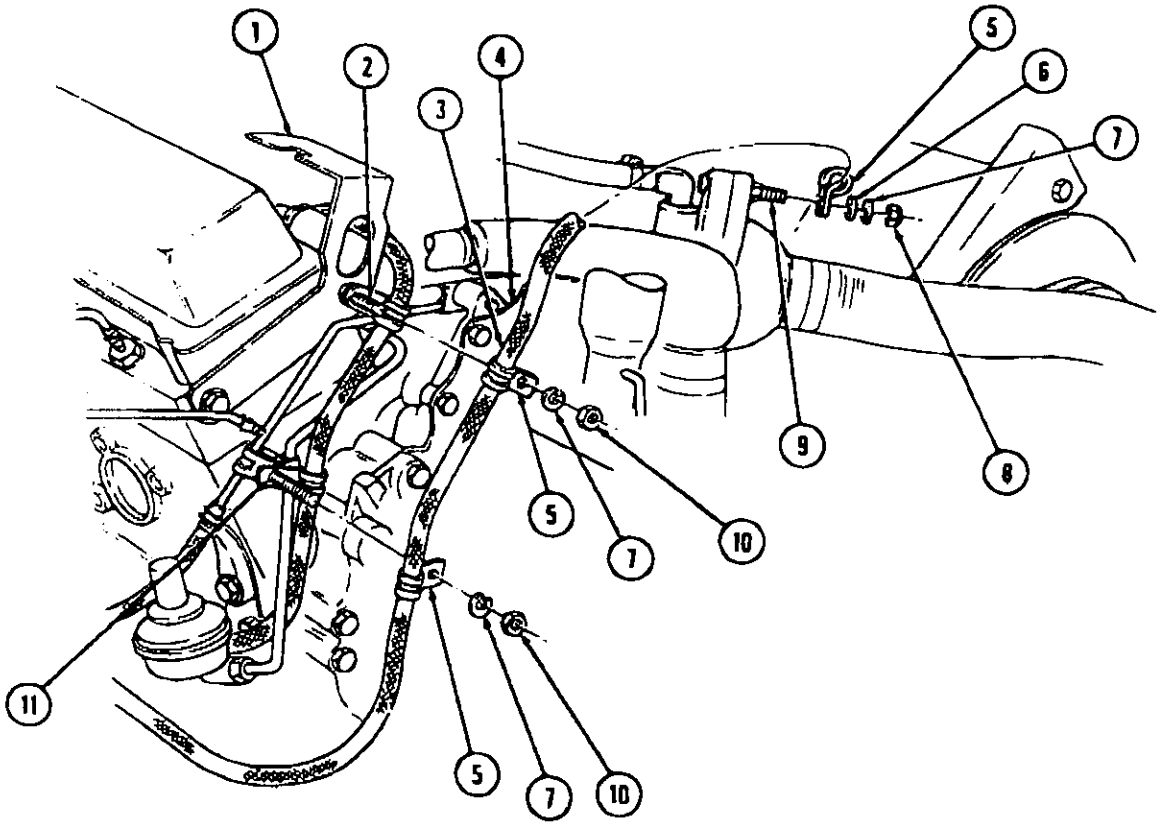


Figure 11

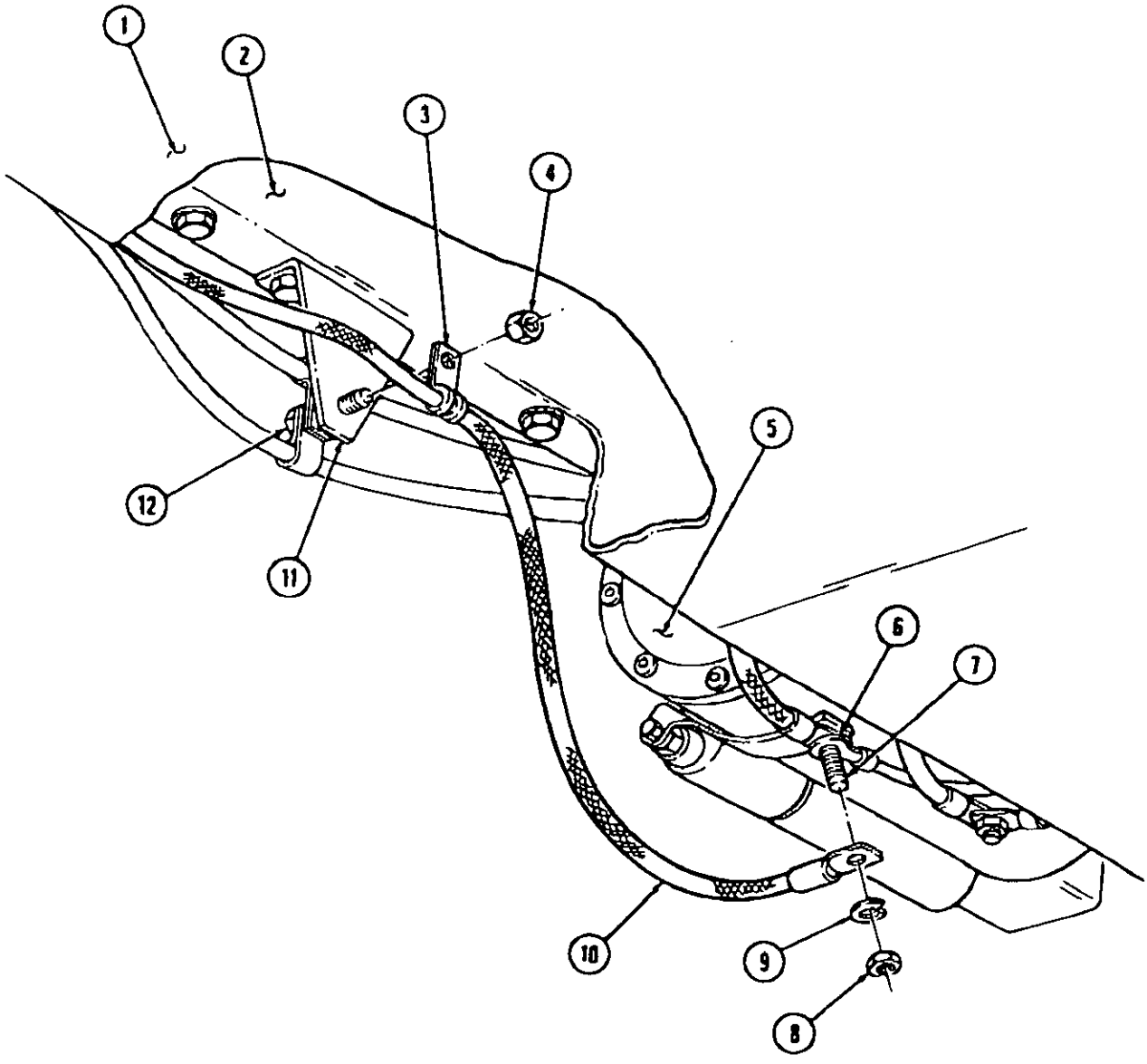


Figure 12

The 154-6732 Pump Kit Is Available To Help Service The Unit Injector Hydraulic Pump Group On 3408E (99C) And 3412E (80M) Machine Engines

1714

D9R (7TL, 8BL),
D10R (3KR) Track-Type Tractors;
24H (7KK) Motor Graders;
631E (1AB),
633E (2PS),
637E (1FB),
651E (4YR),
657E (5YR, 6PR, 6TR, 7KR) Wheel-Tractor Scrapers;
769D (5TR),
771D (6JR),
773D (7ER),
775D (6KR) Off-Highway Trucks;
834B (7BR) Wheel Tractors;
836 (7FR) Compactors;
988F (2ZR),
990 (4FR) Wheel Loaders;
5110 (7GN, 8HN) Excavators;
PM-565 (3TK) Cold Planers

Reference: Special Instruction, "Disassembly And Assembly Of the 144-0835 Unit Injector Hydraulic Pump Group", REHS0192-03.

The engines in these machine are equipped with Hydraulically Actuated Electronic Unit Injectors (HEUI). A part of the HEUI system is the unit injector hydraulic pump group. The new 154-6732 Pump Kit is available to recondition the 134-9405 and 144-0835 Unit Injector Hydraulic Pump Groups rather than replacing the complete pump. The 154-6732 Pump Kit includes:

- Rotating Group.
- Control Piston.
- Yoke.
- Drive Shaft
- Seal Kit.
- Front Bearing.
- Housing Gasket.
- Special Instruction, "Disassembly And Assembly Of the 144-0835 Unit Injector Hydraulic Pump Group", REHS0192-03

Note: The Special Instruction identifies seven tools that must be fabricated to facilitate the disassembly and assembly of the pump. Contact the Caterpillar Dealer for the dimensions and specifications for fabricating the tools. Fabricating these tools will take some time, so please consider this before the first reconditioning of a pump.

Some additional information and corrections for Special Instruction, "Disassembly And Assembly Of the 144-0835 Unit Injector Hydraulic Pump Group", REHS0192-03 follow:

- On Page 2, under Required Tools, add the following sentence.
Contact the Caterpillar Dealer for the dimensions and specifications that are needed to fabricate the tools.

- On Page 4, Remove Step 9.

- On Page 5, add the following information to the end of Step 14:
Visually inspect the 154-6735 Pintle Bearing (20). Replace the bearing with a new 154-6735 Pintle Bearing only if the bearing is defective.

- On Page 5, add the following information to the end of Step 15:
Visually inspect the 154-6735 Pintle Bearing. Replace the bearing with a new 154-6735 Pintle Bearing only if the bearing is defective.

- On Page 5, change Step 17 to read: Remove the spring seat (18) and spring.

- On Page 6, change the Note after Step 20 to read:
Note: Protect the face of the valve block by placing the face on a soft surface.

- On Page 6, add the following Note before Step 1:
Note: Thoroughly clean both the housing and the valve block before reassembling the unit injector pump.

- On Page 6, change Step 3 to read: Install the spring, the spring seat (18) and the yoke (22).

- On Page 8, change Step 9c to read: Once the rotating group is installed, turn the rotating group in order to ensure that the three pins (34) are still in the special notches. If the rotating group jams, the pins (34) need to reinserted into the proper position. The three pins in the rotating group are held in the special notches with a "C" clip retaining ring. The "C" clip applies force against the inside diameter of the rotating group's cylinder block in order to hold the pins in position. See Illustration 32.

- On Page 9, after Step 18, add the following Note:
Note: Step 19 through Step 21 defines the procedure for the installation of the shaft seal. These steps should be followed precisely. The shaft seal should be placed barely below the face of the housing. The snap ring should then be positioned against the seal. Both the snap ring and the seal should be driven into the bore together until the snap ring seats in the groove.

- On Page 9, change Step 23b to read: Tighten the bolts (2) to a torque of 16 ± 1 N•m (12.0 ± 0.5 lb ft).

■

Supplement for Testing Service Brake Holding Ability

4251

621F (4SK), 623F (6BK), 627F (1DL) Wheel Tractors

Reference: Service Manual Module, SEBU6719, Operations and Maintenance Manual, 621F Wheel Tractor Scraper. Page 115; "Test Service Brake Holding Ability" This manual is part of Service Manual SENR6375

Service Manual Module, SEBU6720; Operations and Maintenance Manual, 623F Elevating Wheel Tractor-Scraper; Page 112; "Test Service Brake Holding Ability" This manual is part of Service Manual SENR6380

Service Manual Module, SEBU6712, Operations and Maintenance Manual, 627F Wheel Tractor--Scraper; Page 126; "Test Service Brake Holding Ability". This manual is part of Service Manual SENR6385.

The following corrections should be made

The sentence in Step 5 stating, "The expected engine rpm should be 1500 ± 100 rpm or higher." should be deleted from all three referenced Service Manuals Also in Step 5, an rpm of 1400 is specified This should be changed to 1200.

In Service Manual Module SEBU6712, for the 627F Wheel Tractor Scraper, the instructions in Step 5 say, "The service brake should prevent the machine from moving at 1500 ± 100 rpm." This rpm value should be 1200 rpm. Also in Service Manual Module SEBU6712 for the 627F Wheel Tractor-Scraper, it should be made clear that only the tractor engine is used for this test

Step 5 should read as follows for Service Manual Module, SEBU6719, for the 621F Wheel Tractor Scraper, and Service Manual Module, SEBU6720, for the 623F Elevating Wheel-Tractor Scraper

5. Gradually increase the engine speed rpm The service brake should prevent the machine from moving at 1200 rpm

⚠ WARNING

Personal injury or death can result from the machine moving during the brake testing.If the machine begins to move, reduce the engine speed immediately and engage the parking brake.

Record the actual engine rpm obtained during the test for future comparisons.

If the engine rpm is lower than 1200 rpm, consult your Caterpillar dealer for inspection and repair

In Service Manual Module, SEBU6712, for the 627F Wheel Tractor Scraper, the section below the first illustration on Page 127 should read as follows

1. Start the tractor and scraper engines. Allow the air pressure to reach 850 ± 50 kPa (125 ± 10 psi) on the air pressure gauge

2. Disengage the scraper transmission by moving the scraper transmission neutral switch to the ON position

3. Raise the bowl slightly.

4. Apply the service brake and release the parking brake

5. With the service brake applied, move the transmission to Second speed forward.

6. Gradually increase the engine speed rpm The service brake should prevent the machine from moving at 1200 rpm

⚠ WARNING

Personal injury or death can result from the machine moving during the brake testing. If the machine begins to move, reduce the engine speed immediately and engage the parking brake.

Record the actual engine rpm obtained during the test for future comparisons.

If the engine rpm is lower than 1200 rpm, consult your Caterpillar dealer for inspection and repair

7. Reduce the engine speed to low idle, move the transmission to NEUTRAL Move the scraper transmission neutral switch to OFF Engage the parking brake, lower the bowl to the ground and stop both engines

Note: If the machine moved while testing the brakes, contact your Caterpillar dealer. Have the dealer inspect and, if necessary, repair the service brakes before returning the machine to operation

Note: If brake friction material requires replacement, the new friction material may require burnishing for maximum performance See your Caterpillar dealer or refer to Special Instruction SEHS9187, for burnishing procedure

■

Service Replacements for Discontinued Piston Pumps

5070

D5H (7NC, 8RC, 9HC, 1DD, 1YD, 2SD, 3MD, 4KD),
D6H (8KB, 4RC, 6FC, 2TG, 4LG, 1FJ) Track-Type Tractors;
12G (3PL, 61M),
14G (96U),
16G (93U),
120G (4HD, 87V, 11W),
130G (74V, 12W),
140G (72V),
160G (4JD) Motor Graders;
416 (5PC),
426 (7BC),
428 (6TC),
436 (5KF),
438 (3DJ),
446 (6XF),
446B (5BL) Backhoe Loaders

Piston pumps have been discontinued for the above machines. Replacement piston pumps are available.

Replacement pumps are different from discontinued pumps, as follows:

- Overall length is less than the discontinued pump.
- Although orientation of port and compensator may be different, the mount for the discontinued pump can be used.
- Drain and signal port locations are different. Line arrangements will require modification.

Replacement pumps and parts (to modify lines to pump ports) are listed in the following charts.

COURTESY OF CATERPILLER CORP.

12G (3PL1-819, 61M12027-13530), 130G (74V2321-2478), 140G (72V10334-12648), 160G (4JD141-152) Motor Graders

Service Parts for (discontinued) 9T-1417 Piston Pump		
Qty.	**Part No.**	**Description**
1	124-3027	Piston Pump
Pump Inlet Adapter		
1	118-8682	Adapter
1	5H-8848	O-Ring Seal
4	8T-6868	Bolt
4	8T-4223	Washer
Pump Outlet Adapter		
1	7T-8593	Block
1	4J-0520	O-Ring Seal
4	8T-5005	Bolt
Pump Signal Line		
380 mm (15 in)	2P-5943	Hose
1	6V-9945	Coupling Assembly
1	6V-9947	Coupling Assembly
2	4S-5414	Sleeve
2	6V-8397	O-Ring Seal
Control Valve Drain Line		
1400 mm (55.1 in)	2P-5943	Hose
1	6V-9945	Coupling Assembly
1	6V-9946	Coupling Assembly
2	4S-5414	Sleeve
2	6V-8397	O-Ring Seal
Gear Pump Mounting (Attachment Pump)		
1	9T-1327	Coupling
1	8C-6886	Retaining Ring (If required)

12G (3PL820-Up, 61M13531-Up), 130G (74V2479-Up, 12W), 140G (72V12649-Up), 160G (4JD152-Up) Motor Graders

Service Parts for (discontinued) 6E-1279 Piston Pump		
Qty.	**Part No.**	**Description**
1	6E-5072	Piston Pump
Pump Inlet Adapter		
1	118-8682	Adapter
1	5H-8848	O-Ring Seal
2	8T-6868	Bolt
2	8T-4223	Washer
Pump Outlet Adapter		
1	7T-8593	Block
1	4J-0520	O-Ring Seal
4	8T-5005	Bolt
Pump Signal Line		
380 mm (15 in)	2P-5943	Hose
1	6V-9945	Coupling Assembly
1	6V-9947	Coupling Assembly
2	4S-5414	Sleeve
2	6V-8397	O-Ring Seal
Control Valve Drain Line		
1400 mm (55.1 in)	2P-5943	Hose
1	6V-9945	Coupling Assembly
1	6V-9946	Coupling Assembly
2	4S-5414	Sleeve
2	6V-8397	O-Ring Seal

Technical Service Information

INTERNATIONAL

Subject File: ENGINES

Subject: Release of 88° C (190° F) Coolant Thermostat

Models: DT 466, International® 530, DT 466E and International® 530E

Description: A new thermostat is released starting with serial number 1082180 and above.

The new thermostat provides a higher engine coolant temperature during extended idling and cold weather operation. The thermostat begins to open at 88° C (190° F) and is fully open at 100° C (212° F) as opposed to the current thermostat that begins to open at 82° C (180° F). In addition, the new thermostat improves emissions output at low power ratings.

The new thermostat replaces the prior thermostat for all applications. When using the new 190° F thermostat on prior model year engines it should be noted that the engine operating temperature will be slightly higher.

Parts Affected:

Part number for the new thermostat is as follows:

New Number	Description	Displaced Part
1 830 256 C91	Thermostat	1 822 575 C92

Technical Service Information

INTERNATIONAL®

Subject File: ENGINES

Subject: Loss of Power and Engine Knock on International® T 444E Engines Built January, 1997 and Later with Split Shot Fuel Injectors

DESCRIPTION:

All T 444E 1997 Model Year engines use split shot fuel injectors ID part No. 1822803C1 or 1825125C1 and a dead head fuel system (effective on engines with serial No. 460195 and up; also, engines with serial No. 432842 and up on United Parcel Service applications).

The fuel system now referred to as a dead head system, means the left and right bank fuel rails no longer have the ability to return fuel. All return fuel comes from the pressure regulator located ahead of the fuel rail check valves (See Dead Head Fuel System Diagram, **Figure 1**).
A full description of split shot injectors is explained in Service Letter TSI–97–12–09.

A loss of power sometimes accompanied by a knocking sound can be caused by fuel restriction to the cylinder head on subject engines. The fuel supply fitting in the cylinder heads (right rear and left front) has an orifice that can become restricted, usually debris from the supply line rubber seal **(See Figure 2)**. Diagnosing the engine for this condition may generate multiple cylinder contribution codes on one bank.

–NOTE–

DO NOT REPLACE THE FUEL INJECTORS!

Remove the suspected fuel supply line to the cylinder head (left front or right rear) and inspect the fitting for debris. Inspect the supply line rubber seal and replace if necessary (P/N 1812348C1). When installing a new seal the metal tube should be bottomed in the fitting in its normal position while the tube retainer nuts are tightened.

–IMPORTANT–

BE SURE TO INSTALL THE CONNECTOR FITTING AS DESCRIBED HERE TO ENSURE THE RUBBER SEAL IS SEATED EVENLY. IF FITTING IS NOT INSTALLED PROPERLY THE SEAL CAN BE CUT.

Removing the debris from the fuel inlet fitting to the cylinder head should restore proper engine operation.

An engine knocking sound, "cackle" some times described as a fuel knock or connecting rod knock, can be caused by the fuel regulator valve sticking or debris caught in the seat. Fuel transfer pump pressure that drops below 35 psi at idle can aggravate the "cackle" concern. Disassemble the regulator **(See Figure 3)** and inspect for sticking, debris or broken spring, replace if necessary with regulator valve package (P/N 1823641C91). Remove the fuel supply line from the 3–way fitting at the fuel supply pump **(Figure 2A)** and inspect the supply line rubber seal, replace if necessary (P/N 1812348C1). When installing a new seal the metal tube should be bottomed in the fitting in its normal position while the tube retainer nuts are tightened.

–IMPORTANT–

BE SURE TO INSTALL THE CONNECTOR FITTING AS DESCRIBED HERE TO ENSURE THE RUBBER SEAL IS SEATED EVENLY. IF FITTING IS NOT INSTALLED PROPERLY THE SEAL CAN BE CUT.

Note – If the conditions described in this letter still exist after performing these procedures, refer to the engine diagnostic manual for further diagnosing.

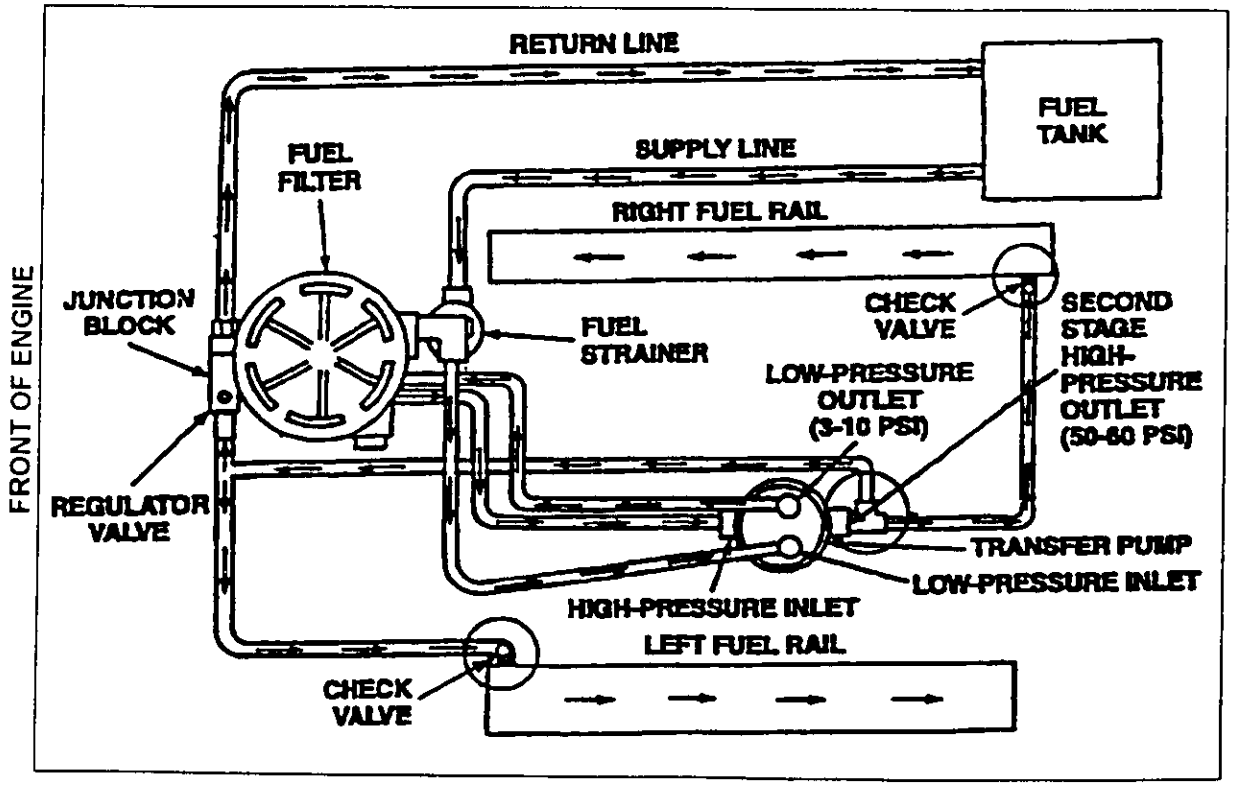


Figure 1. – Dead Head Fuel Supply System Flow Diagram

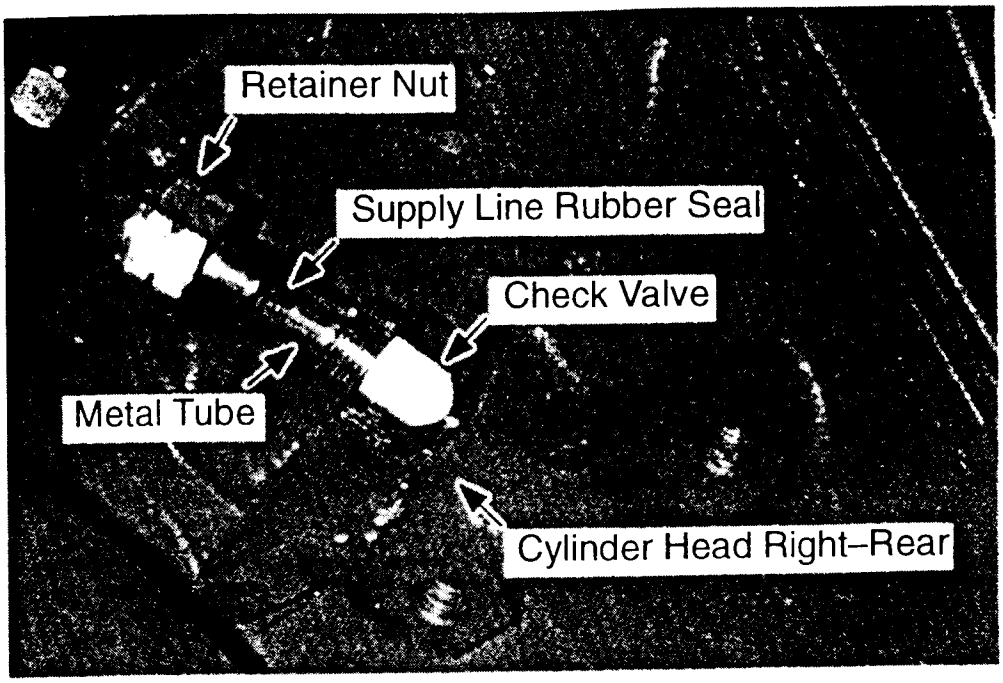


Figure 2. – Fuel Supply Fitting (Check Valve) At Cylinder Head

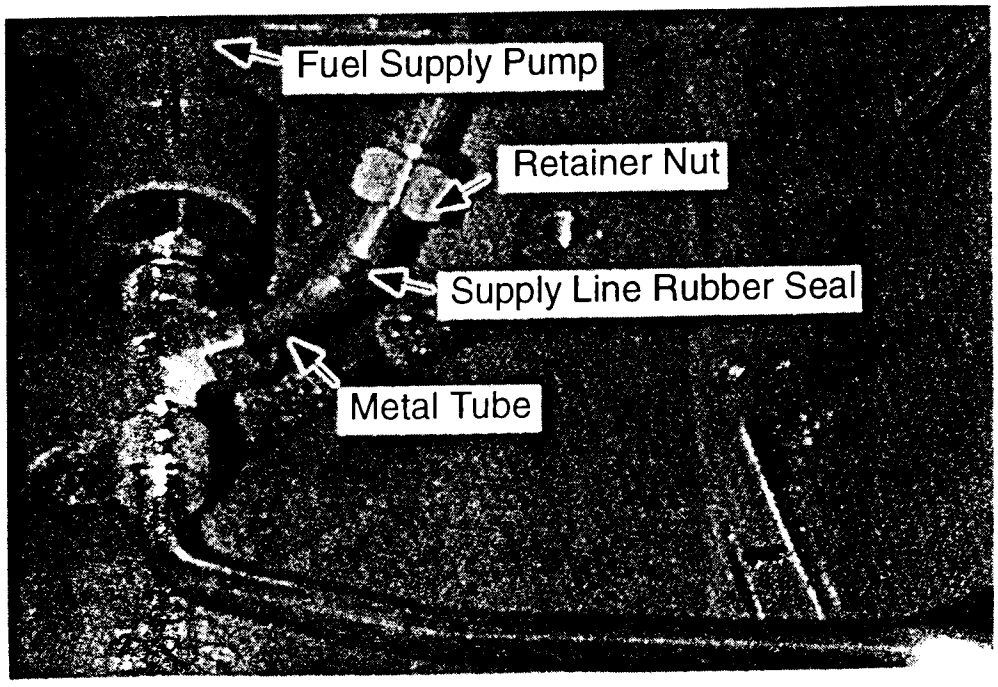


Figure 2A. – Regulator Valve Fuel Supply Fitting At Three–Way Fitting

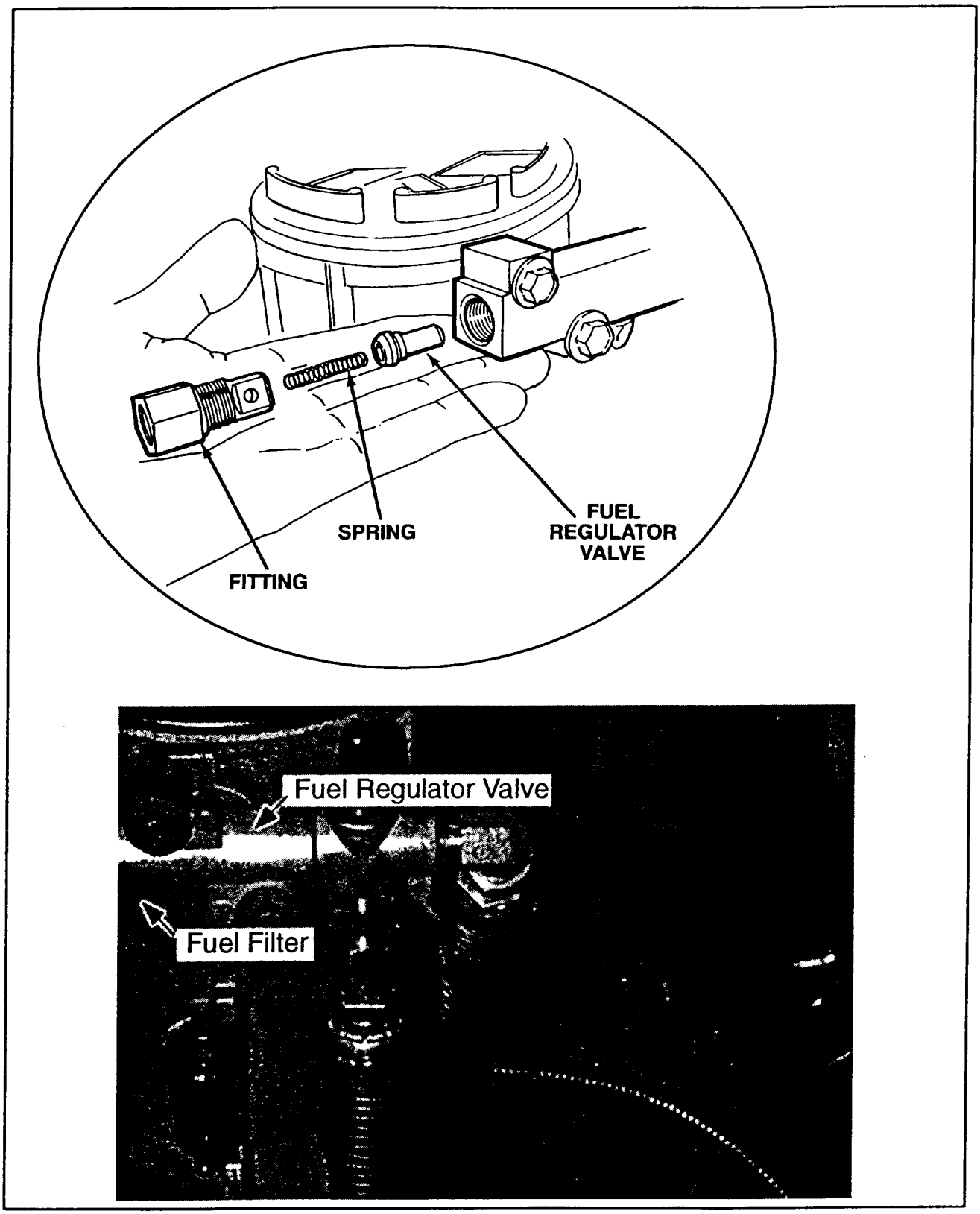


Figure 3. – Fuel Regulator Valve

Technical Service Information

INTERNATIONAL®

Subject File: ENGINES

Subject: Camshaft Position (CMP) transducer Usage on International® T 444E Engines

DESCRIPTION:

The T 444E engine camshaft position (CMP) transducer (sensor) was changed to gold plated connector pins starting with 1996 1/2 Model Year (engine serial No. 375549 and above). Prior model years use a CMP sensor with tin plated connector pins.

Gold plated connector pins will help increase reliability and are compatible with the engine harness connector, which now has gold plated female connectors.

–CAUTION–

DO NOT INTERCHANGE THE GOLD AND TIN PLATED PIN CMP SENSORS. ENGINE FAILURE COULD RESULT. THE CMP SENSOR 'S OUTPUT IS REQUIRED TO DETERMINE CAMSHAFT SPEED AND POSITION FOR THE CONTROL OF FUEL QUANTITY, INJECTION TIMING AND OVER–SPEED SHUTDOWN. SEE PART NO. IDENTIFICATION IN CHART BELOW.

CMP SENSOR P/N (& NOSE LENGTH)	CONNECTOR TYPE	MODEL YEAR	ENG. SERIAL NO.
1825899C92 (1.142") Replaces: 1825899C91 (1.152")	Gold Plated Gold Plated	1996 1/2	375549 & Above
1821720C98 (1.142") Replaces: 1821720C97 (1.152") 1821720C96 (1.152")	Tin plated Tin plated Tin plated	Prior to 1996 1/2	375548 & Below

The connector pins can be visually checked to determine the type of coating. The tin plated pins will have a grayish dull finish and the gold will be gold colored.

Technical Service Information

INTERNATIONAL®

Subject File: ENGINES

Subject: International® **T 444E** Engine Cylinder Head Gasket Replacement

DESCRIPTION:

The new 1997 Model Year T 444E cylinder head gasket will be used to service **all T 444E** model year applications.

NEW PART NO.	DESCRIPTION	DISPLACED PART NO.
1826672C1	Cylinder Head Gasket (Serviced in Qty. of Two)	1825289C1 and/or 1814271C1
1830826C92	Cylinder Head Gasket Package (Includes (2) Head Gaskets, (16) Valve Seals & Instructions)	1824158C91 and/or 1812330C92

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